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Bousset

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(54) **WIPER BLADE COMPRISING A SUPPORT MOUNT, AN INTERNAL VERTEBRA AND A CONNECTING ELEMENT**

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This patent is subject to a terminal disclaimer.

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(30) **Foreign Application Priority Data**

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B60S 1/32	(2006.01)
B60S 1/38	(2006.01)

(52) **U.S. Cl.**

CPC ***B60S 1/32*** (2013.01); ***B60S 1/386*** (2013.01); ***B60S 1/3881*** (2013.01); ***B60S 1/40*** (2013.01); *B60S 1/387* (2013.01); *B60S 1/3858* (2013.01)

(58) **Field of Classification Search**

CPC .. B60S 1/3858; B60S 1/3849; B60S 1/3863; B60S 1/386; B60S 1/387

USPC 15/250.31, 250.32, 250.43

See application file for complete search history.

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(57) **ABSTRACT**

A motor vehicle wiper blade includes a support mount extending in a longitudinal main direction, and including a support for a wiping blade and a tubular body having a longitudinal main axis, a structural element in the form of a longitudinal horizontal strip which is accommodated inside the tubular body, and an element for connecting the blade to a drive arm which is mounted on the support mount and which includes a locking mechanism for locking the structural element in a position in the connecting element. The locking mechanism of the connecting element includes, on the one hand, a longitudinal mechanism for locking the structural element in said position, and on the other hand, an angular mechanism for locking the structural element in said position.

17 Claims, 3 Drawing Sheets

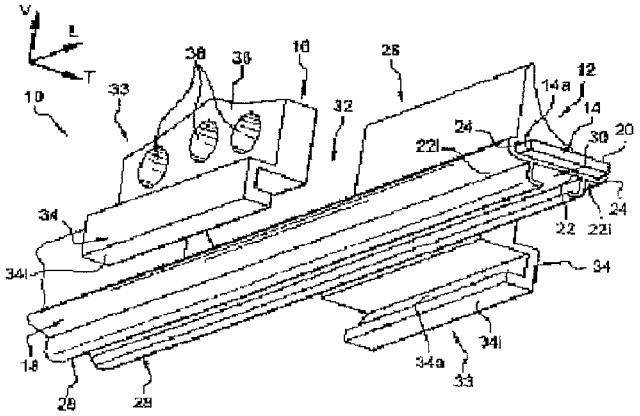
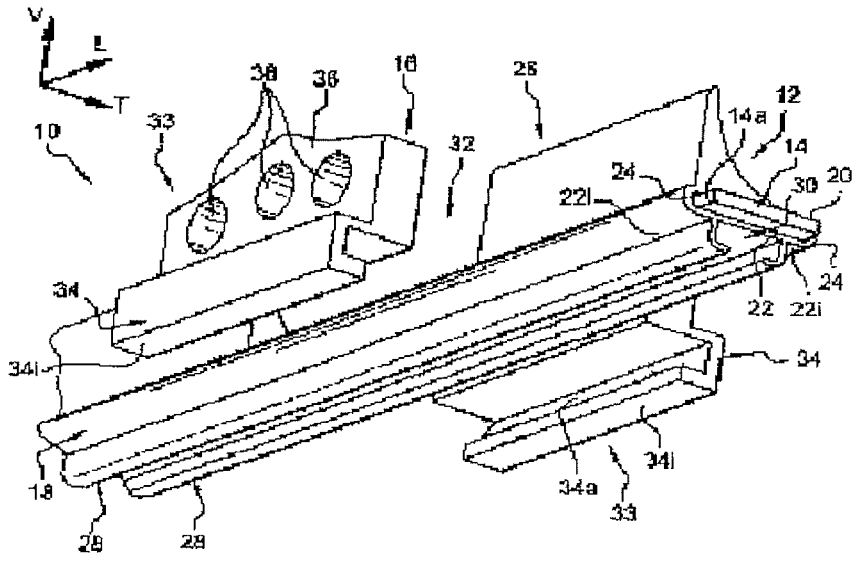


Fig. 1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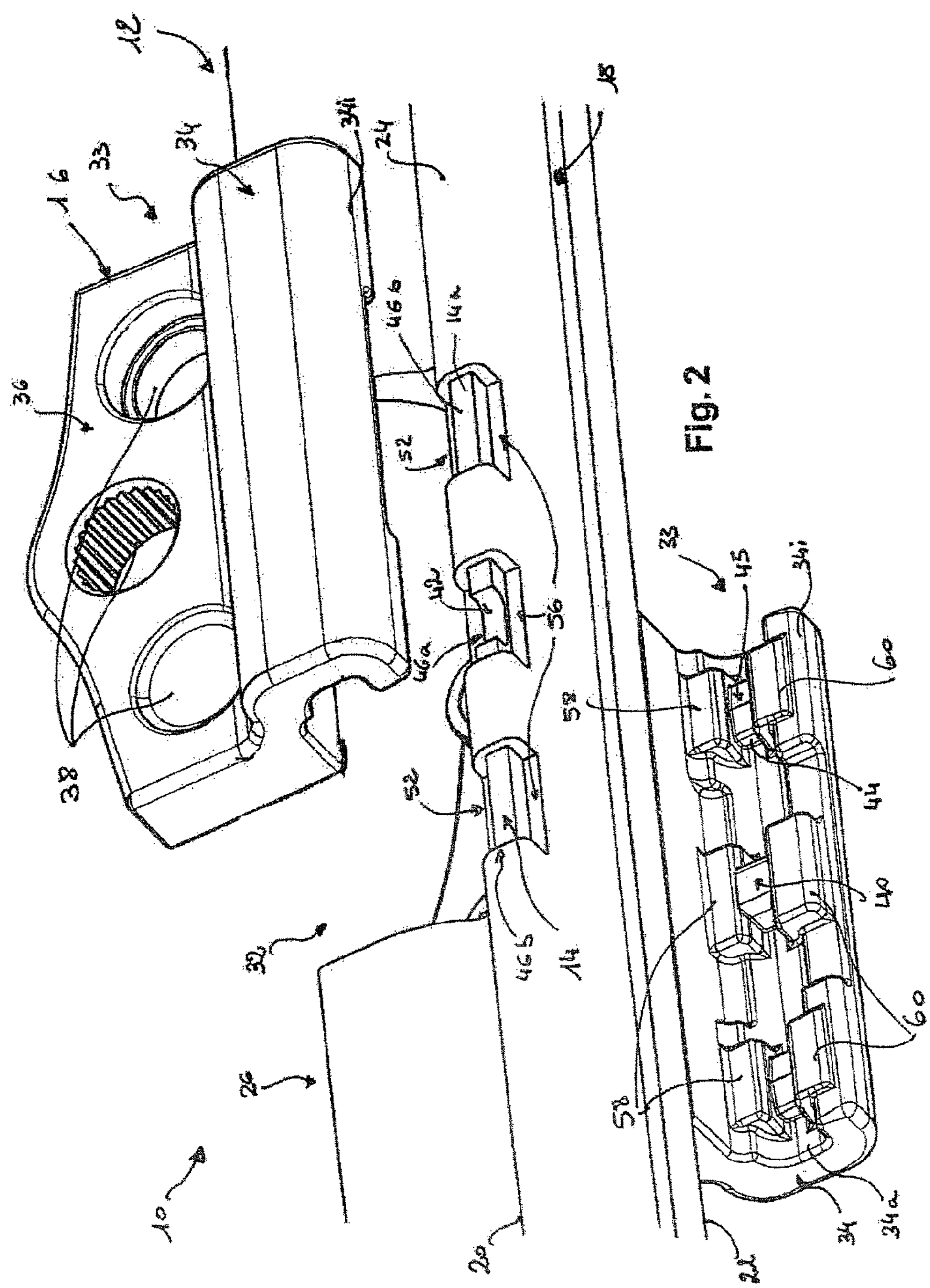
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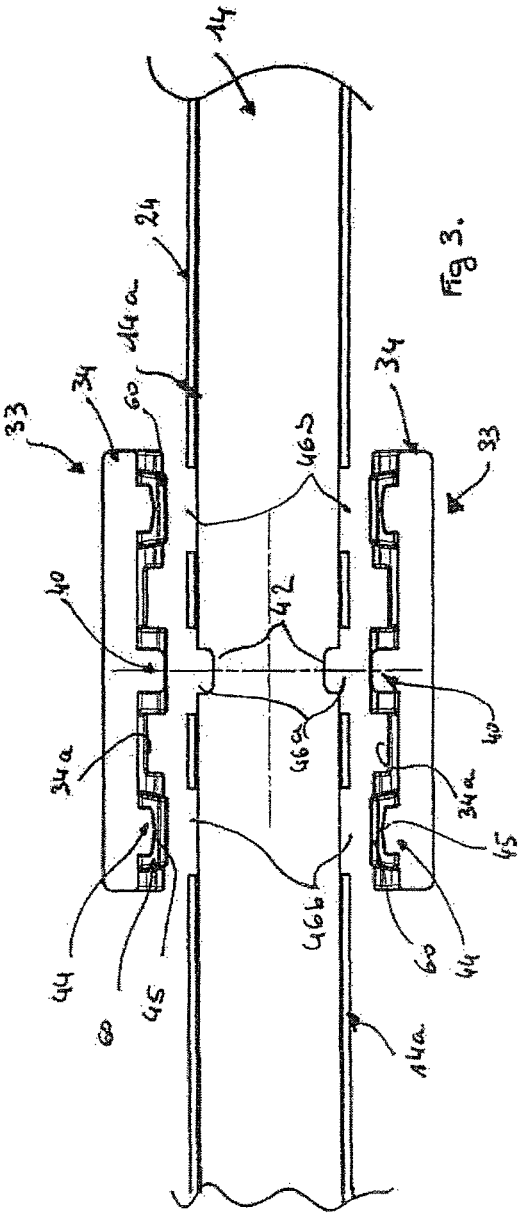
Fig. 2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46a
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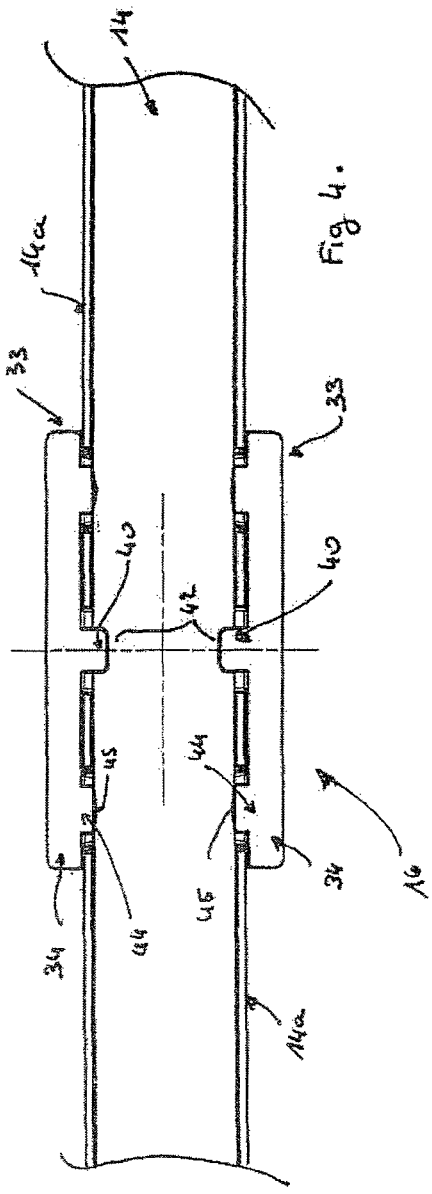
Fig 3.


14
14a
33
40
42
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44
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16
14a

Fig 4.

WIPER BLADE COMPRISING A SUPPORT MOUNT, AN INTERNAL VERTEBRA AND A CONNECTING ELEMENT

This application is a continuation application of U.S. patent application Ser. No. 12/097,009 filed Jun. 11, 2008, which is a national stage application of PCT/EP2006/069560 filed Dec. 11, 2006, which claims priority to FR 0512637 filed Dec. 14, 2005.

The invention provides a motor vehicle wiper blade of the "flat blade" type comprising a connecting element for the connection to a drive arm which provides the fastening of a structural element to a support mount.

The invention more particularly provides a motor vehicle wiper blade comprising:

a support mount having a longitudinal main direction, which comprises means for supporting a wiping blade and a tubular body having a longitudinal main axis;

a structural element in the form of a longitudinal horizontal strip which is accommodated inside a tubular body; and

an element for connecting the blade to a drive arm which is mounted on the support mount and which comprises locking means for locking the structural element in position in the connecting element.

According to a concept which consists in providing low wiper blades, the articulated structure of the wiper blade which carries the wiping blade or wiping rubber blade is omitted, and the association of a hollow support mount with a stiffening longitudinal vertebra constitutes the structure of the wiper blade proper.

The support mount has the shape of a segment of a longitudinal section which includes a tubular body inside which the vertebra, which is in the form of a longitudinal horizontal blade, is accommodated.

The mount finally includes lower mounting hooks for the wiping blade.

The vertebra is made in a rigid material for example steel, making it possible to press the wiping blade against the glass surface to be wiped.

The wiper blade also includes an element for connecting the blade to a drive arm during the wiping, which is mounted around a body of the support mount and which includes locking means for locking the vertebra during a longitudinal motion in a position mounted inside of the body of the support mount.

Document U.S. Pat. No. 6,161,248 discloses a wiper blade of the "flat blade" type for which the connecting element is connected to the vertebra by means of elastic tabs which are accommodated in grooves matching the vertebra.

Document FR-A-2 868 376 discloses a wiper blade of the "flat blade" type, wherein the connecting element is connected to the support mount by locking means composed of teeth which are accommodated in notches provided in the side edges of the vertebra.

During various tests carried out on the later fastening device, clearances appeared between the connecting elements and the vertebra. Such disadvantage is more particularly resulting from the position of teeth with respect to the notches in the vertebra, since the second pair of teeth may not exactly be opposite the associated notches because of the tolerances on the various parts or on the assembling means and if the positioning reference is provided by a first pair of teeth.

Besides, and compulsorily from an industrial point of view, the cuts in the vertebra cause square corners to appear on the edges, and the contact of a tooth at the level of a square corner creates a localized contact area which does not extend on the whole of the tooth geometry and the corresponding notch thereof.

Thus, when and as the wiper blade is used, the teeth progressively and permanently lose their shape, because of the appearing clearances, so that the efficiency of the wiper blade is thus reduced.

The object of the invention is to provide a wiper blade for which the means for locking a vertebra in the mounted position in the support mount are rigid enough not to progressively lose their shape, and which make it possible to avoid any clearance between the various elements of the wiper blade, longitudinally as well as angularly.

For this purpose, the invention provides a wiper blade of the previously described type, wherein the means for locking the connecting element on the support mount, comprise, on the one hand longitudinal locking means for locking the structural element in position, and on the other hand angular means for locking a structural element in position in the connecting element.

Such characteristic more particularly enables the separation of the locking functions, for providing a locking of the structural element in the connecting element in every direction.

According to other characteristics of the invention:

the longitudinal locking means include at least one pin which is accommodated in a notch provided in the structural element;

the pins are at least 2 in number, each one being accommodated in a notch provided in the side edges on either side of the structural element;

each notch has a globally rectangular shape which matches the associated pin;

the angular locking means include holding teeth which cooperate with the side edges of the structural element;

the transversal free end of each holding tooth includes a stop surface which is pressed on the side edge of the structural element during the mounting and/or crimping of the connecting element on the support mount;

the pins and holding teeth are arranged on the side lugs of the connecting element;

each pin and each holding tooth transversely extends towards the inside of the connecting element from an internal vertical longitudinal face of the associated side lug;

with each pin and each holding tooth is associated at least one holding pad vertically positioned on either side of the pin and/or the holding tooth;

with each pin and each holding tooth is associated a pair of holding pads comprising an upper pad and a lower pad vertically positioned on either side of the pin and/or holding tooth;

the holding tooth is positioned transversally back with respect to each holding pad;

the side walls of the tubular body include first and second side openings which are gone through by the pin and the stop surface of the holding tooth of the connecting element, respectively;

the first and second side openings are provided by cutting the side wall prior to mounting the connecting element **16** on the support mount;

each side opening includes an upper cut and a lower cut, wherein the associated upper and lower holding pads are inserted;

each cut and the associated holding pad have matching shapes.

Other characteristics and advantages of the invention will appear upon reading the following detailed description for

the understanding of which reference will be made to the appended drawings, in which:

FIG. **1** is an exploded perspective view of a wiper blade of the generally known "flat blade" type, in which the locking means provided on the connecting element are not shown;

FIG. **2** is an exploded perspective schematic view of a wiper blade including a connecting element complying with the invention;

FIG. **3** is a horizontal cross-sectional view of a wiper blade shown in FIG. **1** prior to the mounting of the connecting element;

FIG. **4** is a view similar to that of FIG. **2**, wherein the connecting element is mounted on the support mount, showing the locking elements in operation.

For the description of the invention, the vertical, longitudinal and transversal orientations will be chosen in a non limitative way, according to a V, L, T system as mentioned in the Figures.

In the following description, identical, similar or analogous elements will be indicated by the same reference numbers.

FIG. **1** shows a known general structure of a wiper blade **10** of the "flat blade" type, which includes the support mount **12** having a longitudinal main direction which carries the other components of the wiper blade **10**, an internal vertebra **14** in the shape of a longitudinal horizontal blade, a connecting element **16** making it possible to connect the wiper blade **10** to a drive arm (not shown) and a wiping blade (not shown). The connecting element **16** comprises locking means for locking the vertebra **14** inside the mount **12** which are not shown in FIG. **1**.

The mount **12** includes a tubular central body **18** having a longitudinal main axis which is delimited by a horizontal upper wall **20**, a horizontal lower wall **22** and by two vertical and longitudinal side walls **24**.

Of course, such delimitation of the tubular body **18** is not limitative. As a matter of fact, the tubular body may have a section of a circular or elliptical shape, insofar as the body is able to accommodate a vertebra **14**, whatever its shape.

The mount **12** also comprises a longitudinal upper rib **26** which extends vertically upwards from the upper face of the horizontal upper wall **20** of the body **18**, and which is aerodynamically shaped, so as to generate pressing forces of the wiper blade **10** on the glass surface, under the action of the wind produced by the movement of the vehicle.

Eventually, the support mount **12** comprises lower means for mounting the wiping blade, which consist in two opposing longitudinal lower hooks **28**, which delimit a tubular body **30** opening downwards, wherein a backbone matching the wiping blade is mounted.

The vertebra **14** constitutes the structural element of the wiper blade **10** which stiffens the mount **12**. The vertebra **14** is made of a rather rigid material for example steel or a composite material and it consists of a longitudinal horizontal blade which is arranged inside the tubular body **18**.

The connecting element **16** is mounted longitudinally, approximately in the middle of the mount **12**, and overlaps the body **18** of the mount **12**, i.e. which means it extends above the horizontal upper wall **20** and on either side of the side walls **24**.

The upper rib **26** includes an opening **32** through which the connecting element **16** is mounted on the mount **12**.

The connecting element **16** is composed of two identical parts **33** which are mounted in an arrangement wherein they are positioned opposite each other on the body **18**, according to a transversal motion.

Each part **33** of the connecting element **16** includes an upper base **36** which rests on the upper face of the horizontal upper wall **20** of the body **18** and which includes means **38** for fixing the upper base **36** of the outer part **33** of the connecting element **16**.

The fixing means **38** more particularly include a bore and a stem for each part **33** of the connecting element **16**.

The connecting element **16** also includes two lower side lugs **34**, each one extending downwards from an upper base **36** of the associated part **33** and being transversally distributed on either side of the body **18** of the mount **12**, so as to provide the transversal positioning of the connecting element **16** with respect to the body **18**.

The lower free end **34***i* of each side lug **34** is bent towards the inside of the connecting element **16** and constitutes a hook extending opposite a lower face **22***i* of the horizontal lower wall **22** of the body **18**. The lower end **34***i* of each side lug **34** thus makes it possible to provide the vertical locking of the connecting element **16** in the position mounted around the body **18**.

As can been seen in FIG. **2**, the connecting element **16** comprises locking means for locking the vertebra **14** in the mounted position inside the hollow body **18** of the support mount **12**.

The locking means of the connecting element **16** are of two types:

longitudinal locking means and

angular locking means.

The combination of the two types of locking means makes it possible to hold the vertebra **14** in position in the body **18** in all the directions.

Longitudinal locking means include at least an internal transversal pin **40** positioned on each part **33** of the connecting element **16**. Such pin **40** cooperates with a notch **42** provided in the vertebra **14** for providing the longitudinal locking of the vertebra **14** in the position mounted in the body **18** of the mount.

The pins **40** are provided on the side lugs **34**.

The notches **42**, which accommodate the pins **40**, are provided in the side edges **14***a* of the vertebra **14** and according to an embodiment of the invention, the notches **42** have a shape matching that of the pins **40**, for example a rectangular shape.

In this case, each side lug **34** includes a pin **40** and each side edge **14***a* of the vertebra **14** thus includes a notch **42**.

Each pin **40** transversally extends towards the inside of the connecting element **16** from an internal vertical longitudinal face **34***a* of the associated side lug **34** and its internal free end is accommodated in the associated notch **42** of the vertebra **14**.

The pins **40** allow an easy positioning of the connecting element **16** on the mount and their cooperation with the notches **42** provides a good longitudinal mechanical holding of the vertebra **14** in the connecting element **16**.

The angular locking means include internal transversal holding teeth **44** positioned on each part **33** of the connecting element **16** which cooperates with the side edges **14***a* of the vertebra **14**. Each holding tube **44** includes a stop surface **45** which is intended to contact a side edge of the vertebra during the mounting.

In this case, each side lug **34** includes two teeth **44** positioned on either side of the pin **40** and each side edge **14***a* over the vertebra **14** thus includes two contact areas.

Each tooth **44** transversely extends towards the inside of the connecting elements **16** from the internal vertical longitudinal face **34***a* of the associated side lug **34** and its stop

surface **45** is pressed on the side edge **14***a* of the vertebra during the mounting and/or the crimping of the element **16** on the mount **12**.

The pressing of the teeth **44** on the sides of the vertebra makes it possible to obtain a good holding in torsion in the case of an angular motion between the mount **12** and the connecting element **16**, as well as vertical holding of the vertebra in the mount.

Such separation of the holding functions according to the various directions makes it possible to adapt the locking means to the desired holding direction and improves the quality and the performances of the connection between the connecting element **16** and the mount **12**.

In such an arrangement, the centre of the notch **42** is the reference for providing the notch **42** and for assembling the wiper blade. Such arrangement with a pair of pins **40** cooperating with a pair of notches **42** then does not require any tolerance or particular clearance for the manufacturing and assembling of the connecting element **16** and the mount **12**.

In addition, for providing the holding of the body **18** with respect to the connecting element **16**, each pin **40** and tooth **44** is designed to be associated with at least one holding pad and preferably a pair of holding pads **58**, **60**, each pad being vertically positioned on either side of the pin or the tooth of the internal face **34***a* of the associated side lug **34**.

Such pads **58**, **60** having a globally rectangular shape make it possible to help positioning the connecting element **16** on the mount **12** and holding the body **18** with respect to the connecting element **16** through their cooperation with the side edge **14***a* of the vertebra **14**.

Thus, the upper **58** and lower **60** holding pads associated with a pin **40** and/or a holding tooth **44** are vertically arranged on either side of the vertebra **14**, thus providing the vertical and longitudinal positioning of the vertebra **14** with respect to the connecting element **16**.

In FIGS. **3** and **4** is shown, in cross-section, the connecting element **16** before and after the mounting on the mount **12**.

Prior to the mounting, the two parts **33** of the connecting element **16** are positioned on either side of, and opposite lateral edges **14***a* of the vertebra **14**, so that the pins **40** match the notches **42**.

The teeth **44**, provided with their stop surfaces **45** are positioned on either side of each pin **40**, opposite the side edges of the vertebra **14**.

After mounting of the element **16** on the mount **12** and fixing both parts **33**, for example by crimping or using locking means **38**, the pins **40** are accommodated in the notches **42** and the top surfaces **45** of the teeth **44** are pressed against the side edges **40***a* of the vertebra **14**.

Besides, as can be seen more particularly in FIGS. **2** and **3**, the side walls **24** of the body **18** include first **46***a* and second **46***b* side openings intended to cooperate with the pins **40** and teeth **44** positioned on the connecting elements **16**.

Such side openings give a direct access to the vertebra **14** and to the side edges **14***a* thereof holding it or resting against it.

Each first side opening **46***a* is positioned opposite each notch **42** and gone through by the associated pin **40** of the connecting element **16**.

The pin **40** is thus accommodated at the bottom of the associated notch **42**, thus improving the longitudinal locking of the vertebra **14** with respect to the connecting element **16**.

The second slide openings **46***b* are positioned on either side of a first side opening **46***a* and gone through by the stop surface **45** of the associated holding tooth **44**.

The tooth **44** is thus positioned at the level of the side opening **46***b* and the stop surface **45** is pressed against the side edge **14***a* of the vertebra **14**.

Such side openings thus give a direct access to the vertebra **14** and its side edges **14***a* for holding it or resting against it.

The first and second side openings **46***a* and **46***b* are made prior to mounting the connecting element **16** on the mount **12** during the manufacturing of the mount **12** by moulding or co-extruding or by cutting operations.

As can be seen in FIG. **2**, the side openings **46***a* and **46***b* comprise in addition an upper cut **52** provided in the upper horizontal wall **20** which transversely extends towards the inside of the mount **12** and a lower cut **56** provided in the horizontal lower wall **22** and which also transversely extends towards the inside of the mount **12**.

In practice, each pair of cuts constituted by an upper cut **52** and a lower cut **56** composes a single opening with the first and second side openings **46***a*, **46***b*.

The upper **58** (not visible in FIGS. **3** and **4** because of the cross-sectional view) and lower **60** holding pads match the upper **52** and lower **56** cuts respectively, which gives a horizontal positioning without any clearance of the support mount **12** with respect to the connecting element **16**.

In this case, as can be seen in FIG. **2**, the upper cut **52** and the matching upper pad **58** have a globally rectangular shape.

In addition, the teeth **44** transversely extend back from the upper **58** and lower **60** pads.

The side edge **14***a* of the vertebra is thus accommodated between the upper **58** and lower **60** pads, thus providing the vertical positioning of the vertebra **14** inside the body **18**, more particularly in order to hold the vertebra **14** in horizontal position.

Such separation of the longitudinal and angular holding functions makes it possible to provide simplified cuts at the level of the vertebra **14** and side opening **46***a* and **46***b* as well as an easy positioning of the parts during the assembling of the wiper blade.

The invention claimed is:

1. A motor vehicle wiper blade, comprising:

a support mount extending in a longitudinal main direction, the support mount comprising means for supporting a wiping blade and a tubular body having a longitudinal main axis;

a structural element in a form of a longitudinal horizontal strip which is accommodated inside the tubular body; and

a connecting element for connecting the blade to a drive arm which is mounted on the support mount and which comprises locking means for locking the structural element in a position in the connecting element,

wherein the locking means of the connecting element comprises:

longitudinal means for locking the structural element in said position; and

angular means for locking the structural element in said position,

wherein the structural element comprises a first side edge,

wherein a first notch is positioned along the first side edge of the structural element,

wherein the first notch accommodates the longitudinal locking means for longitudinally locking the structural element with respect to the connecting element, and

wherein at a location along the first side edge where the first notch is not positioned, the first side edge of the structural element cooperates with the angular locking means for angularly locking the structural element with respect to the connecting element.

2. The wiper blade according to claim **1**,

wherein the longitudinal locking means comprises a pin, and

wherein the first notch accommodates the pin of the longitudinal locking means for longitudinally locking the structural element with respect to the connecting element.

3. The wiper blade according to claim **2**,

wherein the angular locking means comprises a plurality of holding teeth, and

wherein at a location along the first side edge where the first notch is not positioned, the first side edge of the structural element cooperates with the plurality of holding teeth of the angular locking means for angularly locking the structural element with respect to the connecting element.

4. The wiper blade according to claim **1**,

wherein the structural element further comprises a second side edge,

wherein a second notch is positioned along the second side edge of the structural element,

wherein the longitudinal locking means comprises a first pin and a second pin,

wherein the first notch accommodates the first pin of the longitudinal locking means for longitudinally locking the structural element with respect to the connecting element, and

wherein the second notch accommodates the second pin of the longitudinal locking means for longitudinally locking the structural element with respect to the connecting element.

5. The wiper blade according to claim **4**,

wherein the structural element further comprises a second side edge,

wherein a second notch is positioned along the second side edge of the structural element,

wherein the angular locking means comprises a first plurality of holding teeth and a second plurality of holding teeth,

wherein at a location along the first side edge where the first notch is not positioned, the first side edge of the structural element cooperates with the first plurality of holding teeth of the angular locking means for angularly locking the structural element with respect to the connecting element, and

wherein at a location along the second side edge whether the second notch is not positioned, the second side edge of the structural element cooperates with the second plurality of holding teeth of the angular locking means for angularly locking the structural element with respect to the connecting element.

6. The wiper blade according to claim **1**,

wherein the angular locking means comprises a plurality of holding teeth, and

wherein at a location along the first side edge where the first notch is not positioned, the first side edge of the structural element cooperates with the plurality of holding teeth of the angular locking means for angularly locking the structural element with respect to the connecting element.

7. The wiper blade according to claim **1**,

wherein the structural element further comprises a second side edge,

wherein a second notch is positioned along the second side edge of the structural element,

wherein the angular locking means comprises a first plurality of holding teeth and a second plurality of holding teeth,

wherein at a location along the first side edge where the first notch is not positioned, the first side edge of the structural element cooperates with the first plurality of holding teeth of the angular locking means for angularly locking the structural element with respect to the connecting element, and

wherein at a location along the second side edge whether the second notch is not positioned, the second side edge of the structural element cooperates with the second plurality of holding teeth of the angular locking means for angularly locking the structural element with respect to the connecting element.

8. A motor vehicle wiper blade, comprising:

a support mount extending in a longitudinal main direction, the support mount comprising means for supporting a wiping blade and a tubular body having a longitudinal main axis;

a structural element in a form of a longitudinal horizontal strip which is accommodated inside the tubular body; and

a connecting element for connecting the blade to a drive arm which is mounted on the support mount and which comprises locking means for locking the structural element in a position in the connecting element,

wherein the locking means of the connecting element comprises:

longitudinal means for locking the structural element in said position; and

first and second angular means for locking the structural element in said position, wherein the longitudinal locking means is positioned between the first angular locking means and the second angular locking means along a longitudinal direction of the connecting element

wherein the longitudinal locking means comprises a pin, and the in is associated with an upper pin holding pad and a lower pin holding pad, and the upper pin holding pad and the lower pin holding pad are positioned on either side of the pin.

9. The wiper blade according to claim **8**, wherein the pin is accommodated in a notch for longitudinally locking the structural element with respect to the connecting element.

10. The wiper blade according to claim **8**,

wherein the first angular locking means comprises a first plurality of holding teeth,

wherein the second angular locking means comprises a second plurality of holding teeth, and

wherein the first plurality of holding teeth and the second plurality of holding teeth cooperate with a single side edge of the structural element for angularly locking the structural element with respect to the connecting element.

11. The wiper blade according to claim **9**,

wherein the first angular locking means comprises a first plurality of holding teeth,

wherein the second angular locking means comprises a second plurality of holding teeth, and

wherein the first plurality of holding teeth and the second plurality of holding teeth cooperate with a single side

edge of the structural element for angularly locking the structural element with respect to the connecting element.

12. The wiper blade according to claim **11**,

wherein the connecting element further comprises a side lug having an internal face,

wherein the pin, the first plurality of holding teeth, and the second plurality of holding teeth are positioned on the internal face of the side lug.

13. The wiper blade according to claim **12**,

wherein the first plurality of holding teeth is associated with an upper first holding pad and a lower first holding pad,

wherein the upper first holding pad and the lower first holding pad are vertically positioned on either side of the first plurality of holding teeth on the internal face of the side lug,

wherein the second plurality of holding teeth is associated with an upper second holding pad and a lower second holding pad, and

wherein the upper second holding pad and the lower second holding pad are vertically positioned on either side of the second plurality of holding teeth on the internal face of the side lug.

14. A motor vehicle wiper blade comprising:

a support mount extending in a longitudinal main direction, the support mount comprising means for supporting a wiping blade and a tubular body having a longitudinal main axis;

a structural element in a form of a longitudinal horizontal strip which is accommodated inside the tubular body; and

a connecting element for connecting the blade to a drive arm which is mounted on the support mount and which comprises locking means for locking the structural element in a position in the connecting element,

wherein the locking means of the connecting element comprises:

longitudinal means for locking the structural element in said position; and

angular means for locking the structural element in said position,

wherein a transversal length of the longitudinal locking means is longer than a transversal length of the angular locking means,

wherein the longitudinal locking means comprises a pin that is accommodated in a notch of the structural element for longitudinally locking the structural element with respect to the connecting element, and

wherein the pin is associated with an upper pin holding pad and a lower pin holding pad, and wherein the upper pin holding pad and the lower pin holding pad are positioned on either side of the pin.

15. The wiper blade according to claim **14**, wherein the angular locking means comprises a plurality of holding teeth that cooperate with a side edge of the structural element for angularly locking the structural element with respect to the connecting element.

16. The wiper blade according to claim **14**,

wherein the connecting element further comprises a side lug having an internal face, wherein the pin and the plurality of holding teeth are positioned on the internal face of the side lug.

17. The wiper blade according to claim **16**,

wherein the plurality of holding teeth is associated with an upper teeth holding pad and a lower teeth holding pad,

wherein the upper teeth holding pad and the lower teeth holding pad are vertically positioned on either side of the plurality of holding teeth on the internal face of the side lug.

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